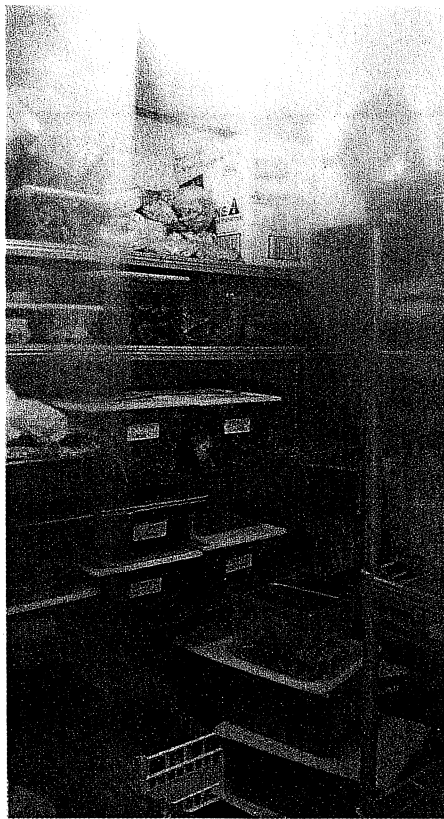


◀ leaving drawers and doors open. Self-return door mechanisms are now a standard feature on some upright refrigerators, along with automatic fan cut-out when doors are open.

However, designers of upright refrigerators can do little to prevent cold air spilling out whenever the door is opened. Jeremy Hall, managing director of new British manufacturer Precision Refrigeration, believes that caterers should give more consideration to drawer-style cabinets for their energy-saving potential. His company is promoting a wide range of cabinets with drawers, from counter and under-counter fridges and freezers to full-size uprights with half-door above and drawers below. There are also choices in energy-saving half-door models. Hall concedes that, volume for volume, drawer cabinets have slightly reduced internal storage space and higher price tags than ordinary door models but he forecasts that, as energy prices increase, they will become a more economic solution.

Adande, which stirred up the commercial refrigeration business with its Varicool concept of multi-temperature cabinets, claims its insulated drawer design needs 40-57% less energy than a comparably sized drawer cabinet of conventional design. Varicool contents are held in removable plastic insulated boxes which drop into the drawers, to which seals are fitted. Even if the drawer is accidentally



Plastic curtains or air curtains keep the cold air in

“
Energy loss stems from kitchen staff leaving drawers and doors open
”

CASE STUDY

When looking at a kitchen's energy consumption and the CO₂ emissions generated, refrigeration equipment needs careful consideration as the energy it uses is estimated to be 6% of the total energy used.

The upright reach-in cabinet is the most-used method of refrigerated storage and accounts for an estimated 17% of all the commercial refrigeration energy used. The last 10 years have seen major changes in the use of the reach-in cabinet, with the efficiency of the freezer cabinet increasing by up to 30%, and the refrigerated cabinet up to 35%. With good housekeeping, it's believed that a cabinet will consume on average 35-50% of its connected load over the working year.

A facility feeding up to 200 people and needing 6,000 litres of refrigerated storage will have 10 single-door cabinets or five double-door cabinets. If we assume we're replacing cabinets that have reached the end of their working life after 10 years using a fix-when-broken policy and the split to be 40% freezer and 60% refrigerated, the following will apply. Existing situation:

- Four single solid-door freezer cabinets present yearly usage 5,757kW x 4 = 23,028kW.
- Six single solid-door refrigeration

cabinets present yearly usage 4,649 kW x 6 = 27,894kW.

- Total yearly energy usage 50,922kW.
- Total cost of energy 50,922 x 5.5p = £2,800.71 per year.
- Total emissions = 21,927 kgCO₂ (5,986kg/carbon).

If you're replacing existing cabinets it's generally less costly to operate one larger unit than two smaller ones. If, however, the operation sees regular periods of low usage it may be more efficient to use two smaller cabinets, because during quiet periods individual cabinets can be switched off. If the existing cabinets, which are more than 10 years old, are exchanged for new double-door cabinets to the same specification as the single-door cabinets, installing them in the coolest part of the kitchen and introducing a system of planned preventative maintenance to maximise the cabinet's efficiency, the following will apply:

- Two double solid-door freezer cabinets yearly usage 4,533kW x 2 = 9,066kW.
- Three double solid-door refrigeration cabinets yearly usage 3,526kW x 3 = 10,578kW.
- Total yearly energy usage 19,644kW-8% = 18,072.

- Total cost of energy 18,072 x 5.5p = £993.96 per year.
- Total emissions = 7,771 kgCO₂, equivalent to 2,121kg/carbon.
- Yearly saving £1,806.75 (64.5%), equivalent to environmental saving of 14,156 kgCO₂ (64.6%).

Hydrocarbons (HCs) are now being introduced in commercial refrigeration as a commercially viable alternative to the hydrofluorocarbons (HFCs) currently widely used. While units running on HCs are generally 15% more energy-efficient than comparable units that run on HFCs, because of their flammable properties certain requirements exist that limit their use. If we exchange the existing cabinets for new double-door cabinets using HCs in place of conventional refrigerants while implementing planned preventative maintenance, the following can be achieved:

- Total yearly energy usage 18,072kW-15% = 15,361kW.
- Total cost of energy 15,361 x 5.5p = £844.86 per year.
- Total emissions = 6,605 kgCO₂, equivalent to 1,803kg/carbon.
- Yearly saving £1,955.85 (69.8%), equivalent to environmental saving of 15,322 kgCO₂ (69.9%).

The other route to explore is a

glycol secondary refrigeration system, which comprises a pair of external chiller units circulating a mixture of chilled glycol and water around a ring main connected to the independently controlled equipment. The system is capable of running a large number of different appliances, chilled areas and coldrooms on one system. A typical Glycol system will reduce the primary refrigeration gas used within a commercial kitchen by up to 72% and will reduce the energy usage by up to 25%. If we exchange the existing cabinets for new double-door cabinets using a glycol secondary refrigeration system while implementing planned preventative maintenance the following applies:

- Total yearly energy usage 18,072kW-25% = 13,554kW.
- Total cost of energy 13,554 x 5.5p = £745.47 per year.
- Total emissions = 5,828 kgCO₂, equivalent to 1,591kg/carbon.
- Yearly saving £2,055.24 (73.4%), equivalent to environmental saving of 16,099 kgCO₂ (73.4%).

Source: David Clarke of the Catering for a Sustainable Future Group, made up of food service consultants and equipment manufacturers and distributors, and a member of the Foodservice Consultants Society International UK



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